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Age-specific prevalence estimates and risk factors for asymptomatic Neisseria meningitidis carriage in Bamako, Mali

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Background: Meningitis outbreaks caused by *Neisseria meningitidis* occur annually in the African meningitis belt. Asymptomatic pharyngeal colonization by meningococci, known as carriage, is common compared to invasive disease and the primary source of transmission of this infection. Yet questions remain about the determinants of carriage in this region.

Methods: We conducted two cross-sectional surveys in Mali, an hyper-endemic, meningitis-belt country, to investigate the epidemiology of *N. meningitidis* carriage. In June 2009, an age- and sex-stratified sample of 250 schoolchildren was recruited, and in May 2010, a population-based, age-stratified survey of 400 residents of randomly selected households was conducted. Participants provided pharyngeal swabs and answered questionnaires. Carriers were identified based on the results of conventional bacteriology and molecular tests of the swabs. We calculated the age-specific prevalence of carriage. Risk factors for carriage were assessed using age- and sex- adjusted log-binomial regression models, accounting for household clustering.

Results: Carriage of *N. meningitidis* was common, particularly in schoolchildren (5-10 year olds: 20.5% (95%CI 13.7-28.7); 11-15 years: 18.0% (95%CI 11.7-25.7)) and in relatively young community members (5-14 year olds: 7.4% (95%CI 2.8-13.6); 15-29 years: 9.1% (95%CI 3.7-15.8)). None of the other possible risk factors that we examined was unequivocally associated with carriage. In the school-based survey, there was a suggestion that risk of carriage increased in those sleeping in the same room with two or more other people (AdjRR: 2.76 (95%CI 0.87-8.71)) or on the same mat (AdjRR: 1.45 (95%CI 0.81-2.59)). In the household survey, individuals who lived in households where wood was used to cook had a reduced risk of carriage compared to those who did not (AdjRR: 0.28 (0.10-0.79)). The prevalence of carriage was modestly, though not significantly, increased in persons who lived with a smoker (AdjRR: 3.10 (95%CI 0.91-10.60)) and who lived in a household with greater than nine residents (AdjRR: 2.09 (95%CI 0.68-6.40)).

Conclusion: We found a relatively high proportion of children and young adults carrying *N. meningitidis* in Bamako, Mali, during a period of low invasive disease incidence. Further investigation is needed to more thoroughly assess the risk associated with sleeping arrangements, crowding, and other household-level risk factors in this setting.

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Possible role of chlamydiae in ocular adnexal lymphoma

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Background: Ocular adnexal lymphomas (OAL) represent malignant lymphoid neoplasms which develop as primary or secondary tumor manifestations in the orbit, conjunctiva, lacrimal gland and eye lid. Some reports suggest that OALs may be an antigen driven disorder, but the source of antigen(s) is not understood. *Chlamydia psittaci* (*Cp*) has been linked to the development and maintenance of ocular adnexal marginal zone B-cell lymphoma (OAMZL) in some countries with varying reports but no study was done in Indian population. The present study was designed to detect chlamydial antigen in ocular adnexal lymphomas in Indian patients.

Methods: Prospective analysis (2010-2011) of 18 cases of ocular adnexal non-Hodgkin's lymphomas was undertaken. Clinicopathological features were reviewed to confirm the diagnosis of non-Hodgkin's lymphoma. Classification of all the eighteen cases was done according to WHO classification (2001). Immunohistochemical characterization of was performed using commercial monoclonal antibodies CD20, clone L26; CD3, clone LN10; CD5 clone 4C7; CD10, clone 56C6 and mAb Cyclin-D1 antibodies. Immunohistochemical localization of *C.trachomatis* and *C.psittaci* antigens was also performed on all the cases using mAb Novus biological, A21.65. Follow up details of 5/18 (28%) patients was available.

Results: Of the 18 cases of ocular adnexal non-Hodgkin's lymphomas, 16 cases (89%) were diagnosed as MALT lymphomas and 2 cases were diffuse large B-cell lymphomas (DLBCL). All 16 cases of MALT lymphomas were B-cell type (CD20 positive), while they were negative for CD3, CD5, CD10 and Cyclin-D1. Chlamydial antigen expression for *C.trachomatis* and *C.psittaci* was detected in a single case of MALT lymphoma. The tumor was located in the left orbit. No systemic spread was present at the time of diagnosis. Follow-up study did not reveal recurrence at 6 months.

Conclusion: MALT lymphomas have been linked with *Cp* infection in different geographical regions. Bacterial clearance with antibiotic therapy is often followed by lymphoma regression. The association of *C.psittaci* with MALT lymphoma may necessitate new treatment modalities against MALT lymphomas.

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